



GARS News

April, 1994

GARS News

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The PRESIDENTS PEN by Howard Gould, W4NVE

Well a lot has taken place since last month. Along with an antenna party, grounding party, VE news and Executive meeting, whose stories are elsewhere in this issue I have a lot to talk about.

This is a reminder to all that I need some help on getting the repeater shack into good condition, we have to replace a couple of boards, and a good paint job, and all donated we hope. The color is not important so those interested give me a buzz.

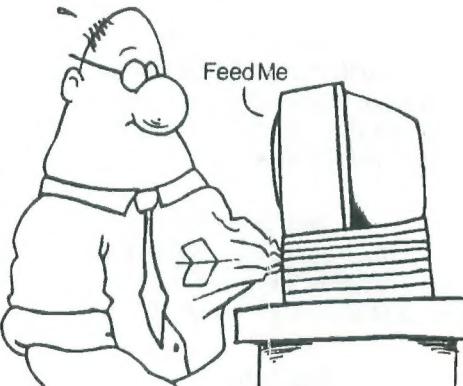
We are in the process of writing a bylaw for elected directors, and an amendment to the existing bylaw on officers. The executive committee has decided that for smoother running officers, we should delete the editor and trustee from the officers. They already serve a purpose, and need to be cut loose so they can do a better job at their one thing. We could say the same thing about the activities manager, but for now we need to have a five member board to eliminate possible ties in voting. As for the directors, there should be three (3), and they should act as an advisory committee to the president as kind of a watchdog to be sure that we all stay within our bounds. They can act as a go between for our members to bring things of importance to the society to the presidents attention.

We need to keep active in the Hog Mountain bike race this year. Sam Roundtree, KD4HMC can no longer act as chairman for that race. David Adcock, KA4KKF our activities manager will be looking for volunteers for that job in May.

We are working on a possible location for field day - the Justice and Administration Building in Lawrenceville

which may become a first for us in conjunction with a proclamation for amateur radio week in Gwinnett county to be given by the commissioners starting off the week. We as a club will be asked to attend the meeting so we can accept the certificate.

We also have a big bike race in June to cover, and a big brand new bike to sell off for the club from last year. We have lots and lots more planned for this year if we can get it all in and the people to help. That's the secret of having a fun club, everyone pitching in for the one cause making things click, and once you



do it you will wonder why you didn't do it before because it is very rewarding. Come on get active!

Our regular club meeting on March 17th (St. Patrick's Day, and yours truly wore shamrock suspenders and a GARS tee shirt) was a great turn out for my first official chance as your president. Did everybody see how well I did at remembering all the officers and committee chairpersons? No one knew what was going to happen next, there was some guy sitting off to my left who I found out at the last moment was our esteemed editor Dean who I understood had been waving his papers back and

forth trying to get my attention. I luckily got him tuned in on my short wave band so he could broadcast his message.

Boy I thought I had it made running this show, why I even went out and purchased an official hard cover copy of the latest Robert's Rules Of Order and brought it for reference. I'll show these turkeys a thing or two I said to myself. Many, many years ago when I was a young ham and newly elected president of a club back east, the only thing we had for a meeting after we officially checked in at the fire station where we had a civil defense set up, was to adjourn to a downtown bar and pool hall where we sopped up some suds and played a few games of pool. we all went home late to tell our XYL's about the tough drills and such that we had to do. The club was the Norwood ARC in eastern Mass, and the club call was K1JMR. We made lots of contacts during field day on my patented phonetics (Jump My Rope).

We will now have a Rookies Corner to have a lot of fun with, you old timers sharpen up your senses and be prepared to answer and help these folks out. Look elsewhere in this issue for Cheryl McClure's, KE4JKM section on this.

We had some good discussions with some newcomers to radio, I think Dennis, KE4IKO learned a lot about the priority channel in his HT, by the way he wields a mean spade when digging ground trenches also. I think Bob, KE4CWI picked up some pointers on phone patch, and lots of us learned a lot about contesting from Jud, W4NZJ; Arnold, KC4ZUA; Vince, KE4DYY; and Vince Jr, KE4DYX who is 14 years old.

I think we all learned a lesson about our hobby at this meeting. We learned that there is a fun side to this thing, the fun of talking about things that we can relate to, the fun of learning something new, the fun of seeing and listening to other members who we never met

GARS News

GARS News is the official monthly organ of the Gwinnett Amateur Radio Society serving its members and other persons interested in the advancement of the amateur radio art. Articles and submissions are invited and encouraged. Submit *News* items via the GARS conference of the Scientific Atlanta BBS (903-5487); on disk, tape or in writing to the Editor or Assistant Editor at their Roster address; via fax to 339-1394 or on packet to the AD4OD-3 PBBS on 145.03. Special arrangements can be made to accept dictation over the phone as well. Most DOS disk formats and ASCII files can be read. Contact the Editor for odd format compatibility. Deadline for article submissions is the first Thursday of each month. The *GARS* address is:

GWINNETT AMATEUR RADIO SOCIETY
P.O. BOX 88
LILBURN, GA 30226

GARS OFFICERS FOR 1994-1995
President: W4NVF Howard Gould 921-8362
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KD4EHG Buddy Dowdell 476-1616
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W4NZJ Jud Whatley 972-1940

COMMITTEES

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PUBLICITY: AD4PZ Joe Biddle 963-4316
FIELD DAY: KD4VHG John Scott 978-0995
HAM CLASSES: KA9UIE Steve Idler 513-0428

GARS ASSOCIATED MEDIA
GARS 2 Meter FM repeater 147.075 ^{MHz}
GARS Conference in Sci-Alt phone BBS 903-5487
WA4I0B 6 Meter Beacon at 50.075 ^{MHz}
WD4JXR-6 / SNELLV Packet Node/Digipeater 147.03 ^{MHz}

SWAP, WANTED and SELL NET
Tuesdays at 9:00PM on the GARS Repeater. 147.075 ^{MHz}

MORSE CODE PRACTICE

An interactive Morse Code practice session immediately follows the 9:00P.M. Tuesday night net on the GARS repeater, and on Thursdays at 9:00P.M..

MEMBERSHIP NOTES

Membership dues for the 1994-1995 are due April 1st. Don't wait! Send them in right away to the GARS address listed above.

\$25.00 for Individual Memberships
\$35.00 for Family Memberships

GARS W5YI-VEC TEST SESSION

4th Friday at St. John Neumann Church - 801 Tom Smith Rd, off Five Forks Trickum Road, Lilburn. Contact Howard Gould, W4NVF at 921-8362. Walk-In Exams - Headphones!

GARS News EDITOR
Dean Matthews, AD4OD 962-8941

ASSISTANT EDITOR
Jack Herndon, KE4EMA 995-0438

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QUA

1st Tuesday,

Metro Atlanta Telephone Pioneers

Odd numbered months at Morrison's on Jimmy Carter Blvd at 7:30PM; Even numbered months at the Southern Bell Center at 12:00 Noon 145.41-

1st Wednesday -

HamWatch

Shoney's 11690 Alpharetta Hwy., Roswell (about 2 1/2 miles North of Holcomb Bridge Rd across from North Fulton Hospital) Dinner at 6:30PM. Meeting is at 7:30 PM

1st Thursday

N.E. Georgia Amateur Radio Club

Jefferson Civic Center, off Memorial Dr. toward Winder from Jefferson. Dinner at 6:15. meeting is at 7:00PM. TI-147.225+

1st Thursday -

Atlanta Radio Club

Days Inn at I-285 and Roswell Rd. Dinner at Old Hickory House at 6:00PM. Meeting is at 7:30PM TI-146.82-

2nd Wednesday

North Fulton Radio League

Cherokee Cattle Company, 11208 Alpharetta Hwy. Dinner at 6:00PM. Meeting at 7:30PM TI-145.47-

2nd Thursday

Alford Memorial Radio Club

Elks Lodge on Memorial Drive. Dinner at 6:00PM Meeting at 7:30PM. TI-146.76-

2nd Saturday

East Atlanta LAN

Scott Blvd Baptist Church in Decatur. Meeting is at 10:00AM. TI-145.41-

3rd Tuesday - Hamwatch

Shoney's 1949 Mountain Industrial Blvd, Tucker (Just North of Hwy. 78) Times: 6:30 PM for dinner prior to meeting. Meeting is at 7:30 PM.

3rd Thursday

Gwinnett Amateur Radio Society

Red Cross Building, Hi-Hope Rd off Hwy 316 in Lawrenceville. Fellowship dinner at Shoney's on Hwy 120, South of 316 at 6:00PM. Meeting is at 7:30PM

before, putting a face with a voice, and before it's all over we will all know each other as true friends. Our meetings should be a place for us to relax and enjoy, to share a laugh or two.

We should not be strangers, we need to be heard no matter how small or big the question is, the problem is that we just don't have enough time to get it all in. Everybody is important, from the new ham to the old timer, we all have our individual lives to attend to, the hobby is secondary, but when we get out for one evening a month, lets enjoy it. The look on a newcomers face after some old timer has given him or her a piece of friendly advice is worth it's weight in gold, and the look on the old timers face after the newcomer has given him or her a piece of advice on something as new as a computer program is a sight to see as the old timer realizes the moment of truth is in the knowing.

Up and coming events that are in the works are Snellville Days, April 30th to cover the parade, need about six to cover it. Sam's Club, Gwinnett Place Mall, radio demonstration on a Saturday, we may do this one in April or May. We need operators to run equipment etc. Lilburn Days in October, still working on this one. There may be other things going on in your community, find out about them, let us know, call David Adcock, KA4KKF. Come on get active!

Many thanks to Johnny Fearon, W4WKP who continues to write the ham of the month for us, and is contributing his talents in many ways, Johnny has been getting us information on repeater purchases both used and new.

We are still looking for a TVI committee, lets see if we can get a viable committee put together so we can help out when the time comes. Give me a land-line, or a buzz at the next meeting.

How about the big auction? any ideas from anyone? All it takes is for a bunch to get together, a little publicity, some gear of all sorts because it doesn't matter if its a working toaster, VCR, TV, or ham gear. If it works or can be used we can sell it and the club will get a percentage of the sale, something like a huge garage sale. Give David Adcock, KA4KKF a call.

Don Ennest, KE4GGP has volunteered to handle QSL cards for the club if he qualifies, and I hope he does, we need someone. If you did not get some mention, it's because it slipped my mind.

I had suggested to the executive committee at our last meeting that we plan an outing either the third or fourth weekend in July where we can get out and have some fun together with a down home barbecue. A place to hold it worthy of mention is Ft. Yargo state park in Winder, which I am told has good shady areas, a lake, and plenty of room to have fun in. We would need reservations and if the club is interested, we need organizers early. Lets take a count and a show of hands for this at the April meeting.

Well that's about it for now, we have a lot to accomplish in the months ahead, I can't do it all myself, you members have to make it all to work, I will do my darndest to see that you all are heard, and that every idea gets a full evaluation for its potential intermix with the clubs plans.

By the way, don't forget the dues are due the first of April, lets see everyone bombard the treasurer with their yearly support with a check at the April meeting. 73. Howie W4NVF. ♦

MARCH MEETING MINUTES

by Ike Chapman, KE4GYM

Gwinnett Amateur Radio Society, Inc. Meeting Minutes, March 17, 1994.

Officers Present: President: Howie Gould, W4NVF; Vice President: Larry Osborne, KD4QFD; Secretary: Ike Chapman, KE4GYM; Treasurer: Charles Evans, WA4QYY; Activities Mgr:

David Adcock, KA4KKF; Newsletter Editor: Dean Matthews, AD4OD; plus 43 members: and 4 visitors.

The meeting was called to order by President Gould at 19:35 local time.

After the introductions of club members and visitors the program was turned over to David, KA4KKF, for the activity portion of the meeting. David introduced Jud, W4NZJ, who presided over a panel discussion of contesting

and amateur radio. The panel members were:

Jud Whatley, W4NZJ
Arnold Solomon, KC4ZUA
Duane Hansen, KD4KCR
Vince Hrabosky, KE4DYY
Vince Hrabosky, Jr., KE4DYX

After a short break, Howie, introduced Cheryl, KE4JKM, who had written to him suggesting that GARS create a focus group for new hams. Cheryl has volunteered to be the point of contact for that group which will be called "Rookie Radio". Rookie Radio will include a column in the newsletter and a Q & A session at each club meeting. The Rookie Radio discussion for this meeting consisted of a discussion of the "call" function on HT's and a explanation of the repeater phone patch by Bob, KA4EMV.

The business meeting was then resumed with the reading of the minutes from the previous club meeting by the Secretary, Ike, KE4GYM. The minutes were accepted as read.

Charles, WA4QYY, gave the treasurer's report. The beginning balance as \$3,027.34, expenses of \$91.06, with an ending balance of \$2,936.28.

Jack, KE4EMA, Membership Chairman, presented two applications for membership which were both approved by the club. The new members are: David Luettgen, N3LWX Bob Snipes, KD4VHW.

Joe, AD4PZ, Publicity Chairman, reported that he is placing information about the club on various BBS's around metro Atlanta, such as meeting dates, meeting location, weekly net, and VEC testing. Joe added that he was hopeful into expanding coverage of club activities into the local news media.

Jay, WA4BXA, reported on the GARS logo and made available several tee shirts for sale with the club logo printed on them. At the suggestion of Pat, KC4DOO, Howie appointed a committee to look into alternate designs of the logo and possible uses. The committee members are Pat, KC4DOO, Bob, KA4EMV, and Dean, AD4OD.

Duane, KD4KCR, reported that after consulting with the W5YI group that there is no conflict with him sending code practice on the weekly net and he would resume this activity.

John, KD4VHG, Field Day Coordinator, reported on the status of plans for this year's event. Field day will be on June 25 and 26 this year with the tentative site being the Gwinnett Justice and

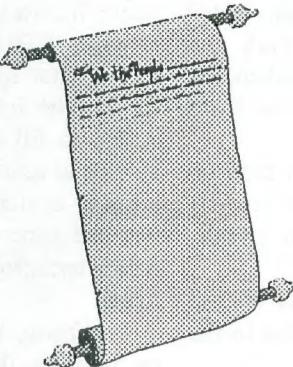
Administration Center. There will be an overview of field day activities at the May meeting with a final review at the June meeting. John will have forms for volunteers for operators, equipment, other needs at the next meeting.

David, KA4KKF, Activities Manager announced that the April meeting will be badge and hat night. There will be a skit performed, the Rookie Radio Q & A will be held and snacks will be served.

Howie, W4NVF, reported that the executive committee is reviewing several of the bylaws and will report back to the club membership on suggested amendments. The executive committee is proposing a change in the composition of the officers of the club from 7 elected officers to 5 elected officers, President, Vice President, Secretary, Treasurer, and Activities Manager. The Newsletter Editor and License Trustee would become appointed positions. The executive is also proposing an amendment to the bylaws to specify the method and composition of a board of directors. The board would consist of 3 directors, selected by the executive committee, that would oversee the general direction of GARS and serve as an advisory panel to the president. The term of office for the board of directors would be one year.

Howie recognized Dick, W4IXN, Fred, K4KAZ, Bob, KA4EMV, and Ron, K4HRB for their work in getting the repeater on-line and their continued maintenance work on the repeater.

Dick, W4IXN, apologized for the problems with the backup repeater and reported that the controller for the main repeater was back from being repaired and the main repeater was operational.



once again. Dick reviewed the current status of equipment and reminded the club that if a new repeater is purchased modifying it for voting receivers would void any warranty and preclude having a service contract for the repeater. Dick recommended that the club continue to follow the plan for the installation of remote voting receivers beginning with the Snellville site, followed by the Water Park site, and finally the Norcross site. Using this plan the club should also be prepared to add PL to the repeater.

Fred, K4KAZ, reported that he will be discussing the history of PL at an upcoming club meeting. Fred also stated that the sites at the Water Park and Norcross will have to re-established due to work done by the county at these sites.

Bob, KA4EMV, asked that the club fully investigate the cost of a new repeater before a decision is made on how to proceed.

David, KA4KKF, asked for the activity form that he had published in the newsletter (received one).

Fred, K4KAZ, asked that anyone interested in helping with technical support of the repeater or learning more about the repeater contact him.

Dean, AD4OD, Newsletter Editor, asked for volunteers with access to high speed copiers to help with copying the newsletter to reduce the expense to the club. Jack, KE4EMA, and Dick, W4IXN, volunteered to help. Dean asked that all committee chairman submit an article each month for newsletter and that each member submit an article as well. Dean also reported that he is ready to have ads placed in the newsletter and is looking for a volunteer to act as ad manager/salesman.

Larry, KD4QFD, reported that he had been in contact with the ARRL and that after the club has been certified as a Special Services Club we can have our own card checker for WAS and DXCC. There can be multiple checkers for WAS but only one for DXCC, and DXCC requires the checker to have 300 confirmed countries. Larry asked for volunteers to contact him.

Howie, W4NVF, reported that he has asked the secretary to obtain certification for the club as a Special Services

Club and asked all members to renew their memberships for ARRL through the club or anyone signing up for membership for ARRL through the club since the club would receive a portion of the dues. Howie also has asked the secretary to process the application for membership in SERA for the club.

Johnny, W4WKP, asked that when PL is activated on the repeater that a voice announcement periodically announce the PL frequency.

Ron, K4HRB, announced that the Georgia legislature has repealed the \$25.00 annual fee for Amateur Radio vanity license plates.

Pat, KC4DOO, ARES Emergency Coordinator for Gwinnett County asked for anyone interested in working with ARES to fill out a form that she provided and return it to her. There will be training available from the fire and police departments but this will require a police background check due to privacy issues.

Howie, W4NVF, asked for a vote on whether the repeater committee should continue to investigate the cost of a new repeater and the cost of repairing the existing equipment. The vote was to the affirmative with no dissension.

Ike, KE4GYM, asked for volunteers to help with the weekly Want, Swap, Sell, and Information net to contact him.

The meeting was adjourned by President Gould at 22:07 local time. ♦

GROUNDING PARTY

by Howard Gould, W4NVF

Saturday March 12th, we got a small crew together for grounding at the main repeater site, I think we did a great job, and I am sure that we now have a better chance of not getting hit with a bolt of lightning that will wipe us out. Those attending were Richard Barnes, W4IXN; Cheryl McClure, KE4JKM; Dennis Ingle, KE4IKO; Joe Biddle, AD4PZ; Ron Davidson, K4HRB; Ike Chapman, KE4GYM and myself. We kicked a lot of dirt around, dug a few trenches, ragchewed a bit, and in general had a very good time. ♦

BIRTHDAYS IN MAY

by Dean Matthews, AD4OD

2nd	KD4RBI	Jeffry Cape
5th	N4ACK	Alan Hecht, MD
12th	KD4NZQ	Ron Greer
20th		Mary Stowell
21st	WB4GKI	Robin Huckaby
22nd	AD4MI	Charles Robison
22nd	KD4PCK	David Mattison
22nd	N2LHB	William Boebel
23rd	KD4HPE	Tom Fort
26th	KD4EXR	Scott Batterton
26th	KB4ZTN	Stephen Diggs

Not on the list or wrong date? Let us know! Ed.♦

HERE YE... HERE YE... ACTIVITIES FOR APRIL

BY DAVID ADCOCK, KA4KKF

THIS MONTH'S MEETING PROGRAM IS AN INFORMAL SHOW-AND-TELL BY ALL ON THEIR FAVORITE HOME-BREW EQUIPMENT OR KIT PROJECTS. APRIL ALSO IS HAT/BADGE NIGHT. WEAR YOUR BEST!!!!

ALSO, BRING ALONG YOUR ROOKIE RADIO QUESTIONS TOO. YOU MAY FIND THE ANSWERS TO YOUR QUESTIONS OR PROVIDE THE ANSWERS FOR SOMEONE ELSE.

IT WILL BE AN INFORMAL PROGRAM THAT EVERYONE WILL ENJOY SEEING AND TALKING ABOUT WHAT THEY HAVE PUT TOGETHER.

VE-NEWS

by Howie Gould, W4NVF

Our active VE team has been asked to bring the team to Jefferson Radio Club in April where there are many new prospective hams waiting to be tested. Charles Davis, AD4KT teaches a class at his club and my understanding at this time is that there may be fifteen or more students ready to take the test for no code tech.

It was brought to my attention that there might be a conflict of interest with Duane, KD4KCR running code practice sessions since he is a VE, so I had it clarified by the VEC and I am pleased to report that there is no question about this being within the rules. There would be a problem if Duane passed out material of any kind having anything to do with license preparation. The other thing that was brought up recently was the GARS VE team and comments were made that this was not officially backed by GARS, and would create a big problem. Well I have news for all concerned, it is sponsored by GARS, and was voted upon by the executive committee under the bylaws provisions for same. The team is self supporting, and it bears no financial responsibility to the Society. ♦

GARS BOOTH

by Ike Chapman, KE4GYM

Sam's Club on Steve Reynolds Blvd. has agreed to let GARS put up a table/booth on a Saturday promoting amateur radio in general and GARS in particular. I haven't set a date yet but I will be talking with the managers at Sam's this coming week.

I need to get some folks to volunteer to help out with this operation, hopefully we can get several to volunteer so we can work in shifts. We can have GARS membership applications on hand and do demonstrations using HT's both for repeater and simplex operation.

If you have any other suggestions for demo's or information to pass along please let me know. ♦

OPERATION ON THE "TOP BAND" - 160 METERS

by Jud Whately, W4NZJ

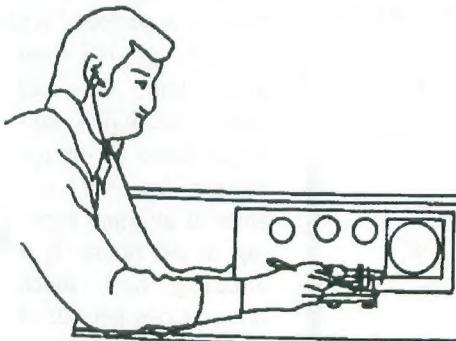
What do 160 and 2 meters have in common? Both bands were or are the starting frequencies for many amateurs! Yep...160 used to be a beginner's band just like the 2 meter band is for many newcomers to Ham radio now.

When the US Navy and Amateurs first started interfering with one another after WWI, the Navy, in their wisdom, forced the amateurs to the "useless frequencies" (200 meters and above) thinking that the choice frequencies were below! Then as more regulation resulted and the amateur bands were created, they were quite different.

On 160 meters, the "ole" Class B operators could operate phone/cw and many would get on this "beginner's frequency" and really cut-up...

playing music for test purposes, blowing horns, etc. If and when one upgraded to Class A then he/she could operate 80 meter CW as it had no phone privileges then, or have 20 and 10 meter phone/cw privileges. 40 or 15 were not amateur bands then. They were added later.

Why was 160 a "beginner's band"? It was simple to build and/or convert existing AM rigs to 160 (1.8 - 2.0 MHz) which is just a "hop and skip" from the commercial AM band. Also, 160 was a prime mobile band believe it or not! It is similar to 75 meters but with less "skipping". Typical distances were limited to about 30 miles from mobile to mobile due to ionospheric "absorption" but much better at nighttime. Also, one only had to simply convert their existing AM auto radio (by tuning it slightly) to 160 meter receive and add a simple 10 - 20 watt AM rig later and they were operating!



I performed a simple 160/75 meter comparison test with my XYL recently. From downtown Atlanta, I transmitted to her using my TS-50 mobile and she copied me S-3 on 75 but S-9+ on 160 meters! While mobile and at nighttime, I have had SSB and AM QSOs with stations in Vermont, Missouri, and Texas! So..it seems the band has some characteristics of 75 meters at night but also different since it does not "skip" as much as 75. Another example of superior mobiling characteristics is a QSO I listened to while living in N.C. I listened to a 160 meter mobile one night traveling from Charlotte, NC to south of Atlanta and into Alabama without losing one word of his many conversations! How many bands do you know that you can do that on?

There is, of course, a downside... QRN (atmospheric absorption during the daytime, static during rainy times and summer). I'm sure each of you have heard that on the A.M. broadcast band. However, the modern rigs with their special filtering, noise blankers, and with the advent of Digital Signal Processor (DSP) units and with the use of SSB, these problem are slowly being defeated.

Another matter are the antennas. While rigs were rather simple, antennas were and are still a different matter because of their physical size. They are very large and "not so pleasing to one's eyes" except for die-hard 160 meter enthusiasts. For example, a simple 1/2 wave length 160 dipole is about 250' in length! "Beverage" receive antennas (special receive antennas used on 160 named for it's inventor - Mr. Beverage) are typically much larger... hundreds or thousands of feet in length depending on one's monetary resources. As you can

see, this fact alone may cause people to "re-think" getting on 160 but years ago, that posed fewer problems since our home lots typically were larger.

What draws people to 160 meters today? Several factors are important. First, the very fact that not many operate on the band is very important in that it's not crowded like 75 or 40 meters. Second, most rigs now have 160 included which they did not a few years ago, and more are trying the one and only medium frequency "MF" amateur band as the sunspot cycle retreats leaving the HF bands less used and in demand. Last, and probably most important, is the band's reputation for being referred to as the "Gentleman's Band" since most who operate are simply ragchewing and taking it easy and not usually operating nets, participating in the many more common contests found on other bands, etc..

In the next issue - 160 Meter Contesting at 3,500 + 100 Feet. -Ed. ♦

EXECUTIVE COMMITTEE

by Howie Gould, W4NVF

The executive committee met at my residence on March 10th to go over club business. Business as usual is not the case anymore since we spent about 3 hours thrashing out a program for 1994 business. We are after the clubs best interests, and believe me when I say we are moving very cautiously into any big expenditure like a new repeater. More important things we went over were the activities for the club which I hope you will find interesting in the coming months, membership plans to increase our new membership, public relations to get out the news, and public events we can sponsor.

I invited a newcomer to ham radio who is now a full blown member since she got her new call, Cheryl McClure, KE4JKM, to the meeting since she has a lot of good ideas to get a newcomer oriented group together and she will do a great job I know. ♦

REPEATER NEWS

by Howie Gould, W4NVF

The new antenna is up on the Lawrenceville water tower, and it is looking great. Hats off to the crew who were involved. Charles Evans WA4QYY, John Scott KD4VHG, Dean Matthews AD4OD, David Adcock KA4KKF, Larry Osborne KD4QFD, Ike Chapman KE4GYM, Brian Ford KC4LYS, Bill Ahls KE4EIH, Richard Barnes W4IXN, Duane Hansen KD4KCR, and myself.

It was a beautiful Saturday morning, March 5th with no wind to hamper the operation. The guys who actually had to climb and set the new antenna in its mounting place had a lot to do, and they set it perfectly vertical.

The ground crew was kept busy also, and we had Larry, KD4QFD taking a video of the operation so we can show it at some meeting in the future. It is amazing how much fun you can get out of an activity such as this. We all had pizza and coke to celebrate the event along with plenty of chit chat.

The repeater was down for a while due to a breakdown in the receiver section, little did Ron, K4HRB and myself know but there was plenty of receivers at Johnny's, W4WKP QTH or the machine would of been back on line earlier. Be aware that the equipment we are using goes back into time, its very old, and has some bugs in it.

We are committed to updating the main system so we can have new equipment that can run without incident for some time and will have the sensitivity required to make life easier on everyone. This is not an easy choice as there are many options open and just as many prices so bare with us as we try to sort this thing out. The plans are for voting machines starting with the Snellville site.

We will also have to go to private line using tone access which all of us should have. Those who don't have it can purchase it for a very minimal amount. The reason for this is that when we go for maximum sensitivity, we invite all kinds of false tripping of the machine and also we have intermod problems that would be eliminated with PL. Otherwise there will be lots of kerchunking going on that will drive everyone batty. We basically have all the setup for the voting machines with very little outlay for the club, most of the equipment had been purchased during prior administrations its all old but apparently in working order.

We are going to move forward one

step at a time until it all falls in place.

Special mention is given to Richard Barnes, W4IXN for his commitment to the club in going forward with his time and effort to see

that the equipment is in fine tune with his test equipment which without we would be no where, and for Fred Runkle, K4KAZ for bringing the repeater committee together as one unit.

There is a very special mention given to Ron Davidson, K4HRB who during very bad weather and extreme short notice gave his devoted attention to helping us out in many, many, instances over the past few weeks at the repeater site working on the equipment trying to keep it going. He also came down with the flu which may have been related to the stress he was under. Ron is a very unique individual who like many other hams in the club will devote his time and talent without question because he wants to help. Thanks Ron.



(REPEATER NEWS, CONTINUED.)

We have some great people on the repeater committee who came forward to spell out some things to us at the March meeting, and I think we all learned a bit from them. Bob DeVeau, KA4EMV gave a good discussion on patch and programming. Dick Barnes, W4IXN discussed the equipment and its limitations, and Fred Runkle, K4KAZ touched base on PL and will be speaking at more length on the subject in May. Ron Davidson, K4HRB (MR. Handyman) is a nice guy to know in a fix, and is part of the back up team.

There is a lot to report and all that is being done to see that the repeater stays on the air. I have been very, very involved over the past month with the repeater. I have seen first hand the equipment that we have, and I have a considerable understanding of the workings of it all.

Going back over the records, it seems that we have been struggling to put together a viable system since 1988. It was not until 1990 that all came into place as far as a repeater system that worked decently but was still full of bugs and partial design problems. The original GE receivers were not what they were made out to be, and that was the first downfall. If it were not for the county tearing down the repeater site at Hurricane Shoals Rd, things might have been different. There was quick shuffling of cards to keep a repeater on the air and Snellville was the chosen site.

There was over six thousand dollars spent on the system. we are talking towers, repeater shacks, all essential things but yet a cost to the club in their context of raising funds in the way of expenses, and actual equipment like receivers, transmitters, a very expensive controller which the system was built around, and numerous other odds and ends. The people behind the building of all this were very good at what they did, and no charge to the club for all their efforts. So when the boom was lowered, and Hurricane Shoals fell, things got worse.

With Snellville up and running, they tried to set up a new site at the Lawrenceville water tower, lightning hit the only good antenna we had, they put Snellville back on, then the equipment

started to fail, some members got upset and angry at the way the repeater committee did things and then we were without any help at all except for a few individuals who tried to keep the repeater running.

This brings us up to date, and now we have all the original people back on the job pitching in with their very best to see if we can not salvage a system that has a lot of good qualities, but yet showing its age and resentment of being abused over a long period of time. We have one of the best controllers on the market, some fairly good Micor receivers, a very good antenna at the Lawrenceville tower with almost 6 dB gain omnidirectional pattern, good excitors, poor amplifiers, and in need of some good 440 receivers (2) for the links.

The problem comes for us to either



look at a very expensive new repeater which could be in the price range of 5 to 8 thousand dollars in order to get the power of an adjustable 100 watt fully loaded commercial repeater, and if we want a service policy we don't know if they will cover us because we need to hook up voting receivers etc. to it. Or continue to pump into the old system by either purchasing some good commercial amplifiers and hot receivers.

There are many unknown factors that we still don't have, the cost of rebuilding some of the system that we have now, and a cost of a new repeater. This will take some extensive searching for both, and not something we can immediately come to the members with. I know there are very anxious people out there who want a good operating repeater now and all I can say is give us some time.

In the meantime, let us go forward with the voting machines starting with Snellville. Lets go for the PL as soon as possible. Dick Barnes, W4IXN, and Ron Davidson, K4HRB will work on the amp and receiver problems we have using existing parts from the system, or at the very least a small purchase of parts to put the amps back on line.

On the positive side, the repeater is doing 100 percent better than it had, even with the quirks in it. Bob DeVeau,

KA4EMV has programmed in all the speed dial numbers, and is programming other things for the controller to do. We will be appointing some control operators as we get into the swing of things, and with everybody pitching in, things should improve greatly.

Without dedicated hams working against all odds, it's almost impossible to continue. I am seeing a lot of sharing of knowledge among the repeater committee and this is good because it means we have a lot of trust for one another. Don't get me wrong, I believe we will still need some new repeater to spark the club, but thank goodness we have what we have to keep us on the air.

We received two hard line connectors from a very good source through Dick Barnes, W4IXN at no charge to the club that could have been close to a couple hundred dollars. We are most grateful for the help given and I have instructed our secretary to send a letter of appreciation to our donor. This means that we can now at least put a new connector in line to replace the section of line that got damaged. Whether or not that will help the receiving end is not known at this time.

At this writing, the executive committee and the repeater committee are scheduling a meeting to go over in great detail and length, the various purchase options of new equipment that they have open to them and what plans are in the works to rebuild the portions of the old equipment needed for our expansion into voting sites. Hopefully, they will have some specific recommendations to be put to the vote at the April meeting by the members so we can go forward from this point in time continuing to build back up what was started 6 years ago. ♦

The AD4OD ALL-BAND GROUNDWAVE ANTENNA

by Dean Matthews, AD4OD

This antenna is an original design based on a combination of ground-wave technology, plate tectonics and Earth substrata composition. It offers all-mode frequency coverage from 2kHz to 1.2 GHz, with a maximum VSWR of 1.5:1 or less across all the bands and so does not require a tuner. It is load rated at legal limit power on all amateur bands, and with its extremely low noise figure is perfectly suited for DX.

The AD4OD Groundwave is neighbor friendly. While no antenna can guarantee such results, no TVI or tele-

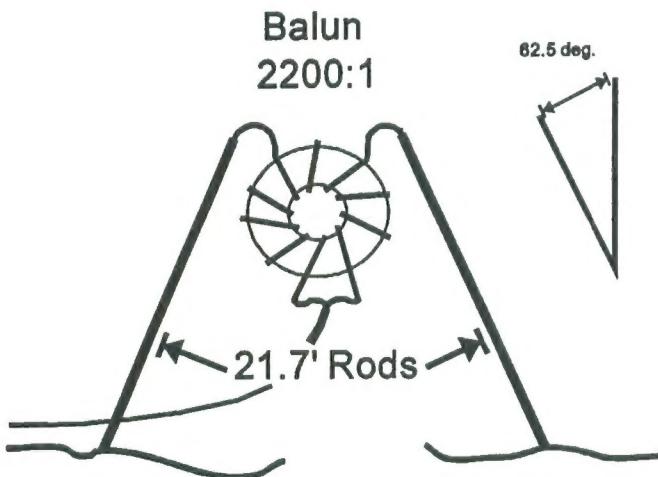
extremely efficient conductor of radio waves since it has a mean relative density of 4.5 gm/cu cm and is composed primarily of iron and nickel. By focusing a radio signal just below the upper limit of the mantle and into the Mohorovicic Discontinuity, the signal will be transmitted through the lithospheric plate all around the world with virtually no loss. The mantle, being resonant across an extremely wide frequency range, carries the signal much like a tapping sound carries down a railroad track.

though if not available a rather large hammer and step ladder could be substituted. The ground penetration points should be 1400 cm apart, center to center. The rod angles and spatial phase relationships are extremely critical to achieve proper focus on the Mohorovicic Discontinuity, so keep both within .005 percent accuracy or the antenna may not function at all.

Next, construct the 2200:1 balun by winding 300 turns of 4-strand of enamel coated 1 inch diameter solid copper wire in twisted quintupolar fashion, wrapped around a 3-foot diameter Amidon T-13300 toroid. This balun is somewhat unwieldy, and may require some assistance in moving about so it is advisable to retain the crawler crane used in the rod insertion process to place it between the rod insertion points, on the ground. Connect one set of the quintupolar windings to the transmission rods with .0025 inch diameter solid hook-up wire. Solder the remaining quintupolar windings to any good coax rated for the RF power to be used and connect to your transceiver or amplifier. The characteristic impedance of the feedline is relatively inconsequential.

That's it, you are now ready to go on the air, with an antenna that will last a lifetime! Some additional benefits of this system will be immediately evident: 1.) Any ants within 100 meters of the antenna will be killed when transmitting and 2.) small rodents and pets will immediately vacate the area, not likely to return. One word of caution, it is highly advisable to install warning placards in homes within about a 2 mile radius near commodes, showers and sinks to use at own risk while transmitting.

One other item of note: This antenna only performs to specifications if the rods are driven in April during a full moon. Happy DX-ing. ♦



phone RFI have ever been reported to amateurs using it, even in high power situations! It is also totally unaffected by nearby stations, rendering it perfect for field day operations.

The secret to the AD4OD Groundwave antenna lies in the discovery of Mantle Propagation. The mantle is the zone between the Earth's crust and core, at the depth of 30 to 3000 meters below the Earth's surface. The mantle is an

Construction of the AD4OD Groundwave antenna is simple. Cut two pieces of 270 cm diameter solid copper rod to a length of 21'7" overall. Sharpen one end of each rod at a 45 degree angle to make installation easier. Drive the rods into the ground at 62.5 degree angles as shown in the accompanying figure. A single piston pile driver and 100 ton Manitowok Crawler Crane are extremely helpful for this operation,

AWARDS COLLECTING

by Ron Davidson, K4HRB

Many newer and "seasoned" members are unaware of the many awards, certifications, and other forms of recognition available from ARRL. Below is a summary. Further info may be located in ARRL publications. A few are:

Rag Chewers Club (RCC): Probably one of the first certificates to be placed on a "newcomer's" wall is this award. The purpose is to encourage "friendly and meaningful" QSOs. Contacts must be at least 30 minutes in length.

Worker All States (WAS): Recognizes operators who work and confirm all 50 states on any bands, any modes, etc. 5 Band WAS is also available for those who work/confirm all 50 states on any Ham band (160 - 2 meters) not WARC bands. (i.e., 100 per band).

A-1 Operator Club: Recognizes those operators who use the best of "operating procedures/techniques". May only become recipient if nominated by two other A-1 Ops.

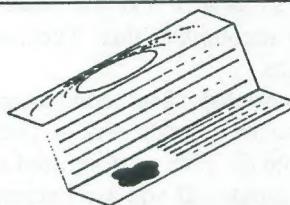
DX Century Club (DXCC): A very prized award! To be eligible one must work/confirm contacts with Hams in 100 "ARRL" recognized countries. Like the WAS mentioned above, ARRL provides further recognition for those who work/confirm contacts on 5 amateur bands (not including the WARC bands).

"Old Timers Club (OTC)": To be eligible for this award, one must have been licensed for 20 years as an amateur, regardless of earlier and/or present calls.

VHF/UHF Century Club (VUCC): Recognizes those who work/confirm 100 "grids".

Extra Certificate: Got your EXTRA? Get this certificate by sending in copy of your license along with S.A.S.E.

Worker All Continents (WAC): Recognizes those who work/confirm contacts with Hams in the 6 continents. Also available are 5 and 6 Band WACs.



Code Practice Certifications: By successfully copying ARRL (W1AW) code transmissions at differing speeds (10, 15, etc. words per minute), Hams first receive certificates then are eligible for higher endorsements as they achieve higher levels of speed.

Again, the above is only a summary but hopefully will "whet many of your appetites".

So... go out there and get them! Good luck! ♦

RENEWAL ALKALINE BATTERIES

by Duane Hansen, KD4KCR

Rechargeable Alkalines? Sounds like a novel idea. Sounds like some money could be saved! The advantages of rechargeable alkalines over non-rechargeable alkalines is obvious, the advantages of rechargeable alkalines over their cousins the ni-cads is debatable. It depends on what you want from a battery.

Consider the AA size of both (that is what I researched) The Renewal Alkaline costs about \$1.25 each, the average ni-cad cost about \$2.30 each. The Renewal charger(s) cost: 4-AA cell \$15.00, 8-AA Cell \$28.00. Note: The 8-AA cell charger can also charge C and D cells. The ni-cad charger you probably already have runs about \$10 to \$15 for a new one.

The Renewal Alkaline initially delivers a solid 1.5 Volts and toward the end of the charge drops off relatively slowly. The average ni-cad delivers 1.2 volts and toward the end of its charge drops like a rock as in "Poof" no more power.

Using a set of 6 batteries in my Alinco DJ-580 translates to 9 volts on alkaline power and 7.2 volts on ni-cad power, increasing the power output of

the radio. Alkaline batteries lasted 2 times longer than the ni-cad pack per charge.

After using ni-cads for about 2 years on and off, none have needed replacement other than the one that came with a Kenwood TR-2400 HT during that time.

The Alinco DJ-580 has been used almost constantly (as many on the GARS 2-meter and the GTS 70cm repeaters can testify to) and has managed finally after 2 months daily use to recharge and discharge the alkalines about 18 times, to the point that they show a noticeable reduction in usage time between charges (approximately 1/2).

I have since bought more of the alkalines and have given the old ones to the family to use in TV Surfboards and broadcast radio receivers, and will continue to monitor how long they continue to last.

Also, one of the most attractive features of the Renewal alkalines is the short recharge times. The literature says about 3 hours for the AA's but I found they recharged to full capacity in less than 2 hours. The little LED indicator goes out indicating a full charge and incidentally stops recharging the battery so you can leave them in the charger indefinitely. As most ni-cad users know, it takes a good 16 hours to recharge ni-cads slowly, the most approved method of charge.

In the semifinal analysis, I wouldn't say that any money is being saved when you compare ni-cads to these new rechargeable alkalines, but when it comes to convenience and total power output there are applications where ni-cads just won't do. Devices such as some Camera Flash attachments have only room for 6 batteries and require the full 9 volts to operate. Since I have just such an item, I would never buy regular alkalines again.

The low initial cost, very close to that of regular alkalines, pleases my short term pocket book but the long life of ni-cads will keep me buying them when I can afford them.

The literature for the alkalines also mentions the absence of the memory problem associated with ni-cads. I think this is a bit silly in that the things won't

last long enough to compare with nicks whether they develop memory or not! Having not had the time to really bench test these new power pods, I think that I have given them a real run for the money and you can make your own decisions. ♦

ROOKIE RADIO

by Cheryl McClure, KE4JKM

Hi. I'm Cheryl McClure, KE4JKM, a new ham and a new member of GARS. I entered the world of ham radio, as many people do, through the two meter door.

But there are so many facets of ham radio to investigate! I'm eager to set up my own shack and try 2 meter, 70 centimeter, 10 meter and packet, just to start. I've bought books to tell me how, but they always omit one or two important pieces of information and never give you the real details needed to get on the air.

Since I've noticed GARS has several new hams joining every month, I thought they might be in the same predicament. Therefore, I asked our President, Howie Gould W4NVF about starting a program to match new hams, or those who just want to learn something new, with hams experienced in those areas. He already



had the same idea and was looking for ways to accomplish this. The result is this notice.

I'm excited about announcing the formation of a group within GARS to learn from the pros. All we need are inquiring minds. If you are interested in learning about any facet of amateur radio, give-me a call and let me know what you want to learn. The ink on your license does not have to be wet to get in on this training. You may be experienced enough to teach one area but be a rookie in something else.

If we have five people who want to set up packet stations, I'll make arrangements for us to visit the shack of someone who is set up for packet and can give us concrete answers to our questions. If there is interest in mobile operation, we could meet in the parking lot before a club meeting and take a tour of club member's mobile rigs. Or if anyone else is as interested as I am in constructing antennas, we can make it a group project to build, install and properly ground a simple dipole. I could really use a nice 10 meter antenna at my house! HINT, HINT.

If this interests you, please give me a call at 995-5159 (5 PM to 10 PM weeknights and noon to 10 PM weekends). If I'm not in, just leave your name, phone number and the best time to return your call. Upgrading your skills has never been so easy! ♦

ROOKIE RADIO FIELD TRIP

Visit a working Packet & all-mode HF ham station and get a hands-on demonstration of what it is all about.

Sunday afternoon, April 17 at 3:00 P.M.

Call Cheryl McClure, KE4JKM at 995-5159 to make a reservation and get directions. Not just for GARS members!

NEW CALLS & UPGRADES

by Dean Matthews, AD4OD

Cheryl McClure has gone from the status of "studying" to that of the license holder of none other than the call of KE4JKM.

Rumor has it that a certain Mr. Vincent Hrabosky Sr., KE4DYY has passed his code element granting him Technician Plus privileges.

And hot off the press: Mr. Jim Baker, no no - not our former secretary of state nor the ex-concubine of the beautiful and mysterious Tammi Fae, but our very own Jim Baker, AKA KC4YBQ is now AKA KC4YBQ/AA.

Yes, after numerous attempts (more than we have fingers to count on), countless sweaty hours of dripping hand-wringing tension outside of VE test areas, two of which where they couldn't get in to the building - he has passed his 13 WPM Morse code element.

The code comes easy to some, harder for others. There was a time when we were considering Jim to be the poster boy for code-dysfunctional technicians everywhere. He has, no doubt, spent more money in VE test fees than the average ham has for a good HF rig, but now it is all worth while, because he has passed. He hurries home, successful Certificate of Completion in hand, ready to terrorize the HF airwaves - as a stroke-AA, none the less. He has, in fact, had enough extra study time to advance himself all the way to Advanced Class in written examinations.

But alas, another black cloud looms on the horizon. His antenna, idle in the back yard, once relegated only to a few hertz of the now-diminishing 10-meter band, is on the band of his dreams, but will not load up! His rig, aging from lack of use, band selector switch glued to the novice band will do little more than spit and sput.

He twists knobs and pushes buttons. He goes to the back yard and examines

what he can from the ground. Still pfffft sprrrkfffft, the rig will not put any fire in the wire.

Undaunted, he bounds to the rooftop to examine his antenna and feedline... in the rain. Imagine his excitement, after all this time the prospect of finally being able to get on the air on 80, or 40 or 20 meters still just out of his grasp.. In desperation he makes a call on the GARS repeater for advice. Much to his incredible luck, he reaches Duane, KD4KCR and yours truly. Duane tells him to take a deep breath and relax, I tell him to get some iced tea and sit down and reflect awhile.

After all, it has been an exciting day, the culmination of months of hard work all piled into an afternoon. His advisors (we) feel that the odds of his antenna going bad the same day he passes is test are as unlikely as winning the big one in the Georgia Lottery. It is much more likely, we each think, that some minor oversight is preventing his success.

Finally the problem is found. The antenna works. Calm has once again descended over Duluth and Jim is ready to get on the air.

As he has family obligations this evening, he is destined for an all-nighter

on a work night. It is, after all Easter Sunday, hardly a day to be solely dedicated to Amateur Radio. But another dragon is nonetheless slain.

I am delighted a little later to be his first contact on 80 meters, though I find he is being somewhat stingy with the RF. After having him turn his microphone gain up and down and sideways, having him hold the mike in all different positions and distances, he gives me a little more juice. Seems he is only putting a few milliwatts into his antenna in some misplaced concern over the possibility of getting in his neighbors appliance.

A pox on this, I say. Knobs to the right, post haste! Load for smoke! After all, those people are not licensed to watch TV anyway.

This he does this and zooooom... my S-meter rebounds with the gusto of a hound dog, curing his "low audio" problem instantly. I can hear him now. As a matter of fact, I may need to replace my external speaker.

OK Jim, I say, lets hang up the phone and work some HF. Is Duluth-to-Suwanee considered DX, I wonder. We were making so little noise, that some guys were trying to move in on "our" frequency, so I had turned on my

amplifier to dust them off. A kilowatt working a flea power station at all of five miles. Something poetic about it, I think.

Ahhh, such it is with many problems, more often a minor oversight than a real mechanical malfunction prevents our getting through on the air. And Jim, as so many of us have done at one time learns some valuable lessons his first day on the "Big Boys" bands... that RF travels so much more efficiently from the radio to the antenna (you didn't think I was going to let this one slide, did you Jim?) when the antenna is connected to the radio. Some things you just have to learn the hard way.

One thing we now know for certain, Drake put some darn good finals in those old rigs.

Now, after fifteen minutes on 80 meters, Jim has the hots for a new HF rig. He has earned it, after all, has he not? Something a little more modern he says, the Yaesu FT-990 is his pick of the litter and the apple of his eye.

Can you imagine how many knobs, buttons, switches and cables that rig has to put in the wrong place. But the pressure is off. He is licensed. And he has made his first Advanced Class contact.

Attaboy Jim! ♦



GARS MEMBERSHIP APPLICATION (SHORT FORM)

Detach and Mail

Amateur Callsign: _____ Class: _____ Expires: ___/___/___ Date of Birth: ___/___/___

Name: _____

Address: _____

City/State/Zip: _____

Home Phone: ___ - ___ Work-Phone: ___ - ___ Fax-Phone: ___ - ___

Type of membership: []-Individual []-Family ARRL Member? Y/N _____ Life? Y/N _____

Additional members for Family Memberships:

NAME: _____ CALLSIGN: _____ CLASS (circle 1) BIRTH DATE ARRL Y/N LIFE?Y/N

E A G T+ T N ___/___/___ Y/N Y/N

E A G T+ T N ___/___/___ Y/N Y/N

E A G T+ T N ___/___/___ Y/N Y/N

Check Interests:

[]-Class instruction []-Field Day operation []-Repeater maintenance []-Gars club booth staffing []-Community events

[]-Emergency []-Administrative []-Fund raisers

[]Other _____

Dues: April 1 to Sept 30

\$25.00 for Individual Memberships

\$35.00 for Family Memberships

From Oct. 1 to Dec. 31:

\$12.50 for Individual Membership

\$17.50 for Family Memberships

From Jan 1 to March 3:

\$6.25 for Individual Membership

\$8.75 for Family Memberships

Mail your completed application with check made out to GARS to: Gwinnett Amateur Radio Society, PO Box 88 Lilburn, Ga 30226



Atlanta Metro Area VE/VEC Examination Schedules From SERA Repeater Journal and other sources. Published as a service to its members, GARS assumes no responsibility for errors or schedule changes. Call and confirm schedules before going. All sessions are walk-in.

1st Sunday - Lawrenceville W5YI-VEC - Jackson EMC
461 Swanson Rd - Lawrenceville - 2:00PM
Duane Reynolds, WB2YAD - 962-9582

1st Monday - Roswell CA-VEC 7:45PM
St Ann Catholic Church - 4905 Roswell Rd - Marietta
Delaine McCarthy, KM4FV - 993-9758

1st Saturday - Clayton Co. Emergency Mgmt Bldg
7496 N. McDonough St. - Jonesboro - 9:00AM
George White, KN4NG 361-6850

2nd Sundays - First Presbyterian Church
183 West Main Street, Cartersville 3:00PM
Mark Swicord, KD4EYF - 975-1309

2nd Tuesday - Walton EMC 7:00PM
3645 - Lenora Church Rd, Snellville
Wayne Taylor, WD4CCA 498-7759

2nd Saturday - Stn Mtn CA-VEC 8:30AM
Stone Mountain-Methodist Church
Hal Martin, KI4RD - 978-9160

3rd Saturdays - Marietta First United Methodist Church
56 Whitlock Ave, Room 319 - 9:00AM
Larry Huff, WA4CQZ - 955-3171

4th Sunday N Atlanta ARRL-VEC - Episcopal Church of the Atonement
2:30PM Highpoint Rd, Atlanta
John King, AB4GKk - 381-5291

4th Friday GARS W5YI-VEC - 7:00PM - St John Neumann Church
801 Tom Smith Rd, off Five Forks Trickum Rd, Lilburn
Howie Gould, W4NVF 921-8362 Headphones!

HAMFEST CALENDAR

April	9 ... Hamfest - Albertville, AL
April	9 ... Hamfest - Perry GA
April	9 ... Hamfest - Oak Ridge, TN
April	9-10 Hamfest - Gainesville, FL
April	10? Hamfest - Clarkesville, TN
April	16 ... TARC Electronics Fest - Summerville, SC
April	17?... Hamfest - Talledega, AL
April	29- until - May 1
 42nd Hamvention - Dayton , OH
May	14-15 Hamfest Toccoa - Hartwell GA
May	14-15 Hamfest - Birmingham, AL
May	28 ... 20th Annual Hamfest - Durham N.C.
May	29 ... 2nd Annual hamfest - Gastonia, N.C.
June	4 ... Athens Radio Club Hamfest, Athens GA
June	11 ... Hamfest - Winston-Salem N.C.
July	16-17 Atl Radio Club Hamfest - Atlanta.

?=Date not confirmed. Several entries taken from SERA Journal.
Georgia locations are bold, Nearby locations are bold and underlined



P.O. Box 88
Lilburn, Ga 30226



GARS - PUTTING SOMETHING BACK INTO AMATEUR RADIO